

Study and characterization by magnetophonon resonance of the energy structuring in GaAs/AlAs quantum-wire superlattices

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(Dated: February 1, 2008)

We present the characterization of the band structure of GaAs/AlAs quantum-wire 1D superlattices performed by magnetophonon resonance with pulsed magnetic fields up to 35 T. The samples, generated by the *atomic saw method* from original quantum-well 2D superlattices, underwent substantial modifications of their energy bands built up on the X-states of the bulk. We have calculated the band structure by a finite element method and we have studied the various miniband structures built up of the masses m_t and m_l of GaAs and AlAs at the point X. From an experimental point of view, the main result is that in the 2D case we observe only resonances when the magnetic field \mathbf{B} is applied along the growth axis whereas in the 1D case we obtain resonances in all magnetic field configurations. The analysis of the maxima (or minima for $\mathbf{B} \perp \mathbf{E}$) in the resistivity ρ_{xy} as a function of \mathbf{B} allows us to account, qualitatively and semi-quantitatively, for the band structure theoretically expected.

PACS numbers: 71.70.Di, 72.20.Ht, 73.21.Cd, 73.21.Fg, 73.21.Hb, 73.23.-b, 73.43.Qt

Keywords: quantum wire superlattices, quantum Hall effect, Shubnikov-de Haas oscillations

Full article available at doi:10.1006/spmi.1998.0640

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